

REMARKS

Claims 1-4 and 13-16 are pending in the present application. Claims 1, 13 and 15-16 are herein amended. Support for the amendments is detailed below. Applicants' undersigned representative, thanks Examiner Farahani for the courtesies extended during the telephone interview of July 3, 2006. Applicants' separate record of the substance of the interview is set forth below.

Applicants' Response to the Claim Objections

Claims 1-4 stand objected to as unclear. Specifically, the Office Action states that it is unclear whether the device pattern or the device pattern margin is compared to the pattern forming margin of the micronized pattern. In response thereto, applicants have amended claim 1 so as to make it clear that the device pattern margin is compared to the pattern forming margin of the micronized pattern. Wherefore, applicants respectfully submit that the informalities regarding the object of the comparison to the pattern forming margin of the micronized pattern have been addressed.

Claims 15 and 16 stand objected to for informalities. In response thereto, applicants have incorporated the Examiner's suggested language into the claims.

In light of the amendments to claims 1, 15 and 16, applicants respectfully request favorable reconsideration.

Applicants' Response to the Rejection of Claims 13-14 under 35 U.S.C. 102

Claims 13 and 14 stand rejected under 35 U.S.C. 102(b) as being anticipated by **Kepler et al.** (U.S. Patent No. 6,037,671). In response thereto, applicants have amended

claim 13 to more distinctly claim the subject matter regarded as the invention. Specifically, applicants have included the feature that each of the broken lines having a plurality of segments are arranged in only the first direction along which the plurality of lines extend. See Fig. 6A and page 19 lines 1-24 of the specification.

The Office Action asserts that **Kepler** discloses that each of the alignment marks is divided by a micronized line and space pattern into a plurality of lines 23a extending along a first direction, and each of the plural lines is divided into a broken line, that is the segments 23a which are extending along a line intermittently, having a plurality of segments.

As discussed in the course of the interview, in regard to the teachings of **Kepler**, the almost square lower left region in Figure 3 including the rectangle regions 23 and the two rectangle regions 22 is divided by the micronized line (rectangle region 23) and space (rectangle region 22) pattern into a plurality of lines (rectangle regions 23), and each of the plural lines (rectangle regions 23) are divided into a broken line having a plurality of segments (finer rectangle region 23a within the rectangle region 23). The Examiner maintains that the peripheral regions of the alignment structure also constitute an alignment mark and that this structure includes vertical lines which are segmented by intermittent horizontal lines. This disclosure of **Kepler** does not anticipate amended claim 13. Specifically, claim 13 has been amended to explicitly represent that the broken line has a plurality of segments arranged in only the first direction along which a plurality of lines are extending.

As shown in FIGs. 6-8 of the specification, the broken line in the present invention comprises a plurality of the segments which are arranged only in the extending direction of the

plural lines each of which is divided into the broken line. The segments of the broken line in the present invention are not arranged in the direction perpendicular to the extending direction of the plural lines, which is therefore distinct from the arranged segments 24a in **Kepler**. Wherefore, applicants respectfully submit that amended claim 13 is not anticipated by the reference.

Applicants' Response to the Rejection of Claims 1-4 under 35 U.S.C. 102 or 103

Claims 1-4 stand rejected under 35 U.S.C. 102(b) as being anticipated, or in the alternative, under 35 U.S.C. 103(a) as obvious over **Kepler et al.** As noted above, applicants have amended claim 1 to clarify that the pattern forming margin of the micronized pattern is larger than the pattern forming margin of a device pattern.

Further, applicants have amended claim 1 to include the feature that the micronized pattern is smaller than the resolution limit of an alignment sensor of a field image alignment (FIA) detecting positions of the alignment mark. The Office Action maintains that the language of claim 1 reads on a pattern having a size smaller than the resolution limit of any potentially usable alignment sensor. In response thereto, claim 1 is amended herein so that the alignment sensor is of field image alignment and detects positions of the alignment marks. See page 14, lines 6-21; page 21, lines 3-8 and Figs. 4 and 7.

Kepler never discloses nor suggests that the micronized pattern, by which the alignment mark is divided, has a size smaller than a resolution limit of an alignment sensor of field image alignment detecting positions of the alignment marks. The section 23 is divided without any consideration of the resolution limit of the alignment sensor of field image alignment. **Kepler** never teaches relationship between the size of the micronized pattern and the resolution limit of

the alignment sensor of field image alignment. Accordingly, Applicants submit that the present invention according to amended claim 1 is not anticipated by **Kepler**.

In addition, the Office Action maintains that the feature of claim 1 of the "micronized pattern having a pattern forming margin larger than a pattern forming margin which a device pattern formed over the semiconductor wafer has" is disclosed by **Kepler**. Specifically, the Office Action maintains that the language, "pattern forming margin", is interpreted to mean the entire area in which a set of micronized patterns is disposed. With this interpretation, the Office concludes that the feature would have been obvious based on the comparison between the disclosed size of the entire area 23 in which the sections 23a are formed and the order of the device pattern or the industry standard at the time of the invention.

However, "pattern forming margin" in the present invention pursuant to amended claim 1 has a meaning which is different from the Office's interpretation. In amended claim 1, when the size of entire area in which the micronized pattern is formed is larger than the order of the device pattern, this relationship in size does not correspond to the relationship in the pattern forming margin.

Namely, the pattern forming margin in amended claim 1 is not related to with the size of the entire area in which a pattern in formed but is related to the pitch of the pattern. Specifically, the meaning of "pattern forming margin" of the present invention is a larger pattern forming margin of a pattern corresponds to a larger pitch of the pattern, and a smaller pattern forming margin of a pattern corresponds to a smaller pitch of the pattern.

The Office Action compares the size of the entire area in which the micronized pattern is formed with the order of the device pattern. Applicants respectfully submit this comparison does not provide a determination that the pattern forming margin of the micronized pattern is larger than the pattern forming margin of the device pattern in the present invention. Namely, to conclude that the feature of the present invention would have been obvious based on **Kepler et al.**, the pattern forming margins having the above-mentioned meanings must be directly compared or at least the pitches of the patterns must be compared. The comparison between the size of the entire area in which the micronized pattern is formed and the order of the device pattern cannot support the conclusion that the feature of the present invention would have been obvious over **Kepler et al.**.

As described above, **Kepler et al.** never discloses nor suggests the features of the present invention according to amended claims 1 regarding the micronized pattern. The present invention according to amended claim 1 realizes high alignment accuracy reducing both of influences of the optical asymmetry of the alignment sensor (TIS, Tool Induced Shift) and influences of the physical asymmetry of the alignment mark (WIS, Wafer Induced Shift). **Kepler et al.** without any consideration regarding the relationship between the size of the micronized pattern and the resolution limit of the alignment sensor, and the relationship between the pattern forming margins of the micronized pattern and the device pattern cannot provide such a high alignment accuracy as the present invention provides. Wherefore, applicants respectfully submit that amended claim 1 and dependent claims 2-4 are not anticipated by **Kepler et al.** and would have been unobvious to one of ordinary skill in the art.

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Amendment under 37 C.F.R. §1.111
Amendment filed: July 5, 2006

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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